OSU Working Papers in Linguistics, 211-227

Kikamba Verb Stem Tonology*

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0. Introduction

Verb stems in the Bantu language Kikamba have a number of different tone patterns on the surface, depending on the tense, aspect and clause type that the verb appears in. In fact, there are 15 verbal tone patterns in Kikamba. However, far from being a random collection of unrelated patterns, this range of melodies emerges from the interaction of a small set of independent and interacting tone assignment parameters.

In (1) we find a few examples of verb stems and the different melodies which can occur.

(1) a. to-kaa-[kon-a — we will hit
[$_{stem}$ root-final vowel
b. to-kaa-[kon-an-a — we will hit each other
[$_{stem}$ root-extension-final vowel
c. ne-to-[kon-an-í-ɛ̂ — we hit each other yesterday
[$_{stem}$ root-extension-t/a-final vowel

In Kikamba, as in many Bantu languages, tense-aspect distinctions are marked not only by selection of appropriate prefixes and suffixes, but also by the stem tone pattern.

* I would like to thank my informant, Beatrice Mulala, a speaker of the Machakos dialect of Kikamba, from whom the data for this paper was gathered. I would also like to thank David Odden for discussion and guidance in the analysis of the Kikamba data. This research was supported in part by NSF grant SBR-9421362.

Kikamba has a large number of tone patterns available to it partially because, unlike other Bantu languages, Kikamba is a four-level tone language; these tones are seen in (2).

(2) SH = super high (ˊ) kotálá L = low (unmarked, or as ¯ in derivations for clarity) kokonà
H = high (´) kosáno.à SL= super low (ˋ) koβálokà

The verbs in (3) demonstrate the 15 surface tone melodies, using the lexically H-tone verb /tál/, meaning 'count.' The analysis of these patterns into a system of independent parameters will be the focus of this paper.

(3)
1. moond' óól' ɔ́ɔkaa[tála — man who will count (future)
2. nétónáa[tálilɛ̂ — we counted (recent past)
3. moond' óólá twaa[tálílɛ́ — man we counted (remote past)
4. nétwáa[tálílɛ̂ — we counted (remote past)
5. ko[tálanelà — to count for each other (infinitive)
6. toíkaa[tálanelá — we will not count for each other (future)
7. nétó[tála.â — we always count (habitual)
8. toí[tálá.â — we don't always count (habitual)
9. [tálána — count each other! (imperative)
10. nóo[tálɛ́ílɛ́ — he counted for (today past)
11. moond' óól' ɔ́ɔ[tálάáŋgéetɛ — man who has counted (pres. perf. cont.)
12. nóo[tálάáŋgɛ́ètɛ̀ — he has counted a little (pres. perf. cont.)
13. toí[tálάáŋgéetɛ̂ — we have not counted a little (present perfect)
14. moond' óólá tó[tálάáŋgilɛ́ — man who we counted a little (today past)
15. nétó[tálάáŋgéetɛ̂ — we have counted a little (pres. perf. cont.)

We first demonstrate that Kikamba has a lexical distinction between H-tone verbs and toneless verbs, a distinction found in all tenses. Then we show that there is a phrasal SL tone which appears in conjunction with affirmative main clause verbs. We next motivate a set of rules pertaining to how a SL tone interacts with adjacent tones, and provide examples of how these tones are manifested phonetically. With that general background to Kikamba tonology, we turn to the system of morphologically-induced tone melodies. We show that the 15 tone melodies of Kikamba can be accounted for by these general principles interacting with three principles of grammatical tone assignment, which are outlined below.

(4) Grammatical Tone Assignment Principles

1. Melodic V_2-High (henceforth, V_2H) tone assignment:
   Assign a H tone to the second μ of the verb stem.
2. Final tone assignment:
   Assign a H, L, SL, or Falling tone to the final μ of the verb stem.
3. Penultimate L tone assignment:
   Assign a L tone to the penultimate μ of the verb stem.

As we will see, some tenses make use of only one of these parameters, while others combine parameters.

1. General tone facts

1.1 Base pattern: Lexical tone

The simplest pattern involves just the lexical tone without grammatical tones. We will refer to this as the base tone pattern. An example of the base pattern is seen in (5), where we find the affirmative, relative clause form of the future tense. (5a) gives a toneless verb, which has only L tones in the stem, and (5b) is a H-tone verb with H on the first stem mora.

(5)	/kon/ toneless verb	hit
	/tál/ H-tone verb	count
	Future, relative clause form: Base pattern	
	a. moond' óól' ɔ́okaa[kona	man who will hit
	b. moond' óól' ɔ́okaa[tála	man who will count

Other tenses which have the base tone pattern are seen in (6).

(6)	Future, negative relative clause form	
	a. moond' óól' ɔ́otákaa[kona	man who will not hit
	b. moond' óól' ɔ́otákaa[tála	man who will not count
	Immediate past, relative clause form	
	c. moond' óólá wáá[kona	man who just hit
	d. moond' óólá wáá[tála	man who just counted
	Habitual, relative clause form	
	e. moond' óól' ɔ́ɔ[kona.a	man who always hits
	f. moond' óól' ɔ́ɔ[tála.a	man who always counts

1.2 Phrasal SL Tone

Now we turn to a general phrasal SL tone. In addition to the lexical tone, main clause affirmative verbs are marked by the presence of a phrase-level SL tone. We will refer to this morphosyntactic class of verbs as assertive. This is demonstrated in (7a,b), where the verb surfaces with a final SL tone. We can verify that this SL is a phrase-level tone by placing an object after the verb. As seen in (7c), the noun 'bananas' ends in a L tone in isolation. However, as seen in (7d,e), when placed after an assertive verb, a SL tone surfaces on the noun. Note also that the verb itself surfaces with a regular L tone, not a SL.

(7) Recent past, assertive form: Base pattern and Phrasal SL tone

a. nétónáa[koni.ɛ̀	we hit
b. nétónáa[tálilɛ̀	we counted
c. ma.i.o	bananas
d. nétónáa[koni.ɛ ma.i.ò	we hit bananas
e. nétónáa[tálilɛ ma.i.ò	we counted bananas

Habitual, relative clause form: Base pattern

f. moond' óól' ɔ́ɔ[kona.a	man who always hits
g. moond' óól' ɔ́ɔ[tála.a	man who always counts
h. moond' óól' ɔ́ɔ[kona.a maio	man who always hits bananas
i. moond' óól' ɔ́ɔ[tála.a maio	man who always counts bananas

The syntactic distribution of this SL tone is complex, but the basic fact is that a SL tone is inserted at the end of any VP beginning with an assertive verb. We can show that the SL on the object in (7d,e) is due to the assertive verb by comparing these examples to ones where a non-assertive verb has an object, as in the habitual relative clause forms of (7f-i). The non-assertive verb does not have a SL prepausally, and an object following such a verb lacks the SL. Thus the final SL in (7a,b) is due to a general phrasal rule. In (8), we see other assertive verb forms that are also characterized by the base pattern and a phrasal SL.

(8) Present progressive, assertive form

a. nétó.o[konà	we are hitting
b. nétó.o[kona maiò	we are hitting bananas

Habitual, assertive form

c. nóo[tála.à	he always counts
d. nóo[tála.a maiò	he always counts bananas

1.3 Tone Rules

We now turn to tone rules that apply generally throughout the grammar.

1.3.1 Word-level Tone Rules

There are three word-level tone rules which interact with a SL tone. To illustrate these rules, we will use the assertive form of the immediate past tense. In (9), we have a bimoraic toneless verb. In (9a) we get the form we expect: the phrasal SL surfaces on the final mora of the verb. And in (9b), the SL surfaces on the final mora of the object, not on the verb, just as seen in the examples in (8).

(9) Toneless, bimoraic verb

a. néwáá[konà	he just hit
b. néwáá[kona maiò	he just hit bananas

However, with a bimoraic H-tone stem, or in a verb with a long penultimate syllable, there are different surface patterns. In (10), we have a toneless verb with a long

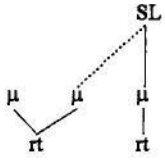
penult. In (10a), an object follows the verb, and the phrasal SL surfaces on the object as expected. However, in (10b), there is a SL tone not only on the final, but also on the penultimate mora.

(10) Toneless verb with a long penultimate syllable

a. néwáá[suuŋga maiò	he just guarded bananas
b. néwáá[suùŋgà	he just guarded
*néwáá[suuŋgà	

In fact, a long syllable with a regular L tone is virtually never followed by a SL tone. Instead, the SL surfaces on the long penult. This can be explained by the rule of SL-Spread, seen in (11). When a final SL is preceded by a long penultimate syllable, the SL tone spreads leftward to the second mora of the penult.

(11) SL-Spread



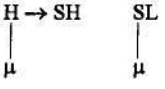
In (12), we have a H-tone verb with a long penultimate syllable. In (12a), we find the expected phrasal SL on the object. In (12b), when the verb is phrase-final, the SL surfaces on the verb, and we notice that the SL spreads leftward to the long penult.

(12) H-tone verb with a long penultimate syllable

a. néwáá[léɛŋga maiò	he just aimed at bananas
b. néwáá- léɛŋgà → néwáá[léɛ̀ŋgà	he just aimed at

However, the H tone of the verb has also become a SH tone. This is due to the rule of Raising, which is seen in (13). This rule raises a H to a SH just in case the following mora bears a SL tone. SL-Spread creates the environment for Raising in (12), and therefore, SL-Spread feeds Raising.

(13) Raising[1]



[1] Note that raising in this context appears to be a dissimilation of pitch level and is not predicted by any current theory of tone features, in which tone interaction is assimilatory. Thus, Kikamba may be evidence that a feature such as [peripheral] is needed in the theory of tone features. (See Ao 1993 for a proposal for 4- and 5-tone languages using the feature [extra].)

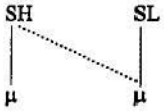
Finally, (14) demonstrates the behavior of a bimoraic H-tone verb. In (14a), the phrasal SL shows up on the object. When the verb is phrase-final in (14b), we find SH on both stem moras.

(14) H-tone, bimoraic verb

a. néwáá[tála maiò	he just counted bananas
b. néwáá- tálà → néwáá[tálá	he just counted

First the lexical H raises to SH by Raising, since it is followed by a final SL, though not a SL on the surface. Subsequently, we apply the rule SH-Doubling, seen in (15a). SH-Doubling spreads a SH tone to a following SL syllable just in case the SL tone is singly-linked. Thus, SH-Doubling occurs in (15b) where the final SL is linked to only one vowel, but does not apply in (15c) where the SL is doubly-linked. This rule explains the surface generalization that SH can never immediately precede a word-final SL tone.

(15) a. SH-Doubling



b. néwáá[tálá	he just counted (14a)
c. néwáá[lɛ́ɛ̀ŋgà	he just aimed at (12a)
*néwáá[lɛ́ɛ́ŋgà	

1.3.2 Phrase-level Tone Rules

In addition to the phrasal SL discussed in 1.2, there is a word-level grammatical SL tone which is assigned to the end of a verb in certain tenses.[2] We now turn to two phrase-level rules, which will be crucial in distinguishing this word-level SL from the phrasal SL. The first rule deletes a SL tone on a head if it is followed by a complement. The crucial fact is that this rule does not apply if the SL tone is a phrasal SL tone, but only if it is a word-level grammatical SL tone.

(16)

a. ko[konà	to hit
b. ko[kona maio	to hit bananas

The verb in (16a) ends in a SL tone, but when a complement is added in (16b), the SL disappears. This is because the SL tone in (16a) is a grammatical SL tone. Compare this behavior to that of a verb ending in a phrasal SL. As seen before, the phrasal SL at the end of the assertive verb in (17a) migrates to the end of the complement in (17b), rather than deleting. To summarize, we can identify the SL tone in (16) as grammatical, while the SL in (17) is phrasal.

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2 This will be explained further in section 2.

(17) a. nétónáa[koni.è we hit
b. nétónáa[koni.ɛ ma.i.ò we hit bananas

A second rule applies just in case a Falling tone is in phrase-medial position. As we will see later, one of the possible grammatical tones that can be assigned to the end of the verb stem is a Falling tone, seen in (18a).

(18) a. toí[konéetê we have not hit
b. toí[konéetế maio we have not hit bananas

However when a complement is added, we no longer have a Falling tone at the end of the verb, but instead we have a SH tone, as seen in (18b). This is due to a phrase-level rule that changes a Falling tone to a SH tone in phrase-medial position. We can compare the behavior of grammatical Falling tone in (18) with that of a surface Falling tone in (19), which arises by combining a final H with the phrasal SL. In (18), prepausal grammatical Fall corresponds to SH medially, whereas in (19), prepausal Fall due to phrasal SL corresponds to plain H plus SL on the following object.

(19) a. tokáa[konâ we will hit
b. tokáa[koná maiò we will hit bananas

Thus, we see that there is evidence for a distinction between word-level grammatical SL and Falling tones, versus phrase-level SL that surfaces as either a SL or a Falling tone. (20) summarizes the behavior of grammatical versus phrasal tones.

(20) a. Grammatical tones
SL tone → Ø when followed by complement
Falling tone → SH in phrase-medial position
b. Phrasal SL tone
SL tone moves to end of first complement following an assertive verb

What we have seen so far about tone can be summarized as in (21).

(21) Summary of Tone Facts
1. The base tone pattern is for verbs to bear a H or L on the first stem mora.
2. There is a SL inserted at the end of the phrase when the verb is assertive.
3. The considerable range of surface tone patterns can be accounted for by low-level rules pertaining to the presence of a SL at the end of a word, (i.e. SL-Spread, Raising, and SH-Doubling).

2. Grammatical Tone Assignment in Verbs

We will now turn to the principles of grammatical tone assignment, and show that the system of grammatical tone reduces to three independent parameters interacting with the general tone rules of the language.

2.1 Tone Assignment Principle 1: Melodic V_2H tone assignment

The first grammatical tone principle is V_2H assignment, which assigns a H to the second mora of the verb stem. The tenses given in (22) illustrate this pattern, and we notice that the second stem vowel bears a H tone. Moreover, all subsequent vowels of the stem also have H.

(22) Tenses exhibiting the Base pattern and V_2H tone:

Remote past, relative clause form

a. moond' óólá̋ twaa[konié	man we hit
b. moond' óólá̋ twaa[tálílé	man we counted

Habitual, negative relative clause form

c. moond' óólá̋ tota[koná.á	man we don't always hit
d. moond' óólá̋ tota[tálá.á	man we don't always count

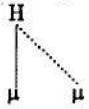
Remote past perfect, negative main clause form

e. toyáa[konááŋgéété	we hadn't hit a little
f. toyáa[tálááŋgéété	we hadn't counted a little

These forms can be accounted for by two rules. First, as seen in (23a), a H tone is assigned to the second mora of the verb stem: this rule applies only in specified grammatical contexts. This V_2H spreads rightward by (23b). These two rules alone suffice to account for (22): there is no phrasal SL here, because these are non-assertive verb tenses.

(23) a. V_2H tone assignment

b. V_2H tone spread (iterative)



It should be noted that this V_2H tone is the only tone which is allowed to spread, which raises the question of why other tones do not spread. One possibility is that other tones, such as lexical tones, must remain linked only to those vowels which they are underlyingly associated with. Thus, since this V_2H tone is a melodic tone not underlyingly associated with any vowels, it is allowed to spread. In Correspondence theory terms, one could postulate a constraint requiring tones to be aligned both on the left and right to the vowels which sponsor them. And since a melodic tone is not sponsored by any particular vowel, it is allowed to spread.[3]

In (24) we see that the assertive future and remote past tenses follow a similar pattern: they have the lexical tone and the V_2H. In addition, there is a phrase-final SL tone due to the fact that these are assertive verbs, as seen in (24). Since these verbs end in a H tone, the phrasal SL tone combines with the final H to give a surface Falling tone.

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[3] This Correspondence theory account was suggested by David Odden (pc).

(24b,d) verify that this is a phrasal SL because SL surfaces on the following object, rather than as a SH tone on the verb (see 1.3.2).

(24) Tenses exhibiting the Base pattern, V_2H tone, and Phrasal SL tone:

Future, assertive form

a. tokáa[konâ	we will hit
b. tokáa[koná maiò	we will hit bananas
c. tokáa[tálâ	we will count
d. tokáa[tálá maiò	we will count bananas

Remote past, assertive form

e. nétwáa[koníê	we hit
f. nétwáa[tálílê	we counted

2.2 Tone Assignment Principle 2: Final tone assignment

2.2.1 Tenses with a final SL tone[4]

The second grammatical principle assigns a tone to the final vowel of the verb: the possible final tones are SL, H, L, and Fall.[5] (25) provides examples of one of the Progressive tenses, in which the tone assigned to the final mora of the verb is a SL tone.

(25) Present Perfect Progressive, negative: Base pattern and Final SL tone

a. totê.o[kona.à	we haven't been hitting
b. totê.o[tála.à	we haven't been counting
c. totê.o[kona.a maio	we haven't been hitting bananas
d. totê.o[tála.a maio	we haven't been counting bananas

Since this tense is not assertive, the final SL in (25a,b) must be grammatical, not phrasal. This is confirmed in (25c,d), where an object follows the verb. If the SL were phrasal, it would have surfaced on the object. Instead, this grammatical SL deletes before a complement, as explained in 1.3.2. Other tenses following this pattern are seen in (26).

(26) Other tenses exhibiting the Base pattern and Final SL tone:

Infinitive form

a. ko[konà	to hit
b. ko[kona maio	to hit bananas
c. ko[tálanelà	to count for each other
d. ko[tálanela maio	to count bananas for each other

Remote past, negative form

e. tóyáá[konanà	we didn't hit each other
f. tóyáá[tálanà	we didn't count each other

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4 Note that we are now discussing the word-level grammatical SL tone, not the phrasal SL tone.

5 In this section, we only discuss tenses with a final SL and a final H tone, since final Fall and final L only occur in conjunction with one of the other two principles, and will be discussed in 2.3.

Today past, negative relative clause form

g. moond' óólá toinaa[koneðyà	man who we didn't cause to hit
h. moond' óólá toinaa[táleðyà	man who we didn't cause to count

Although this SL is a grammatical tone assigned to specific tenses, a look at other verb stem types in (27) demonstrates that the rules of SL-Spread, Raising, and SH-Doubling are applicable, indicating that they are general rules in the grammar. They apply when the SL is in the appropriate environment, regardless of the nature of the SL tone.

(27) Infinitive form

toneless verbs with a long penultimate vowel (SL-Spread applies)

a. ko[maàndà	to search
b. ko[liìndà	to cover

H-tone verbs with a long penultimate vowel (SL-Spread and Raising apply)

c. ko[sɛ́ɛ̀mbà	to run
d. ko[kóòmzà	to fold

H-tone verbs with a short penultimate vowel (Raising and SH-Doubling apply)

e. ko[tálá	to count
f. ko[túβá	to pay wages

In (27a,b), SL spreads left to the long penult. In (27c,d), there is SL-Spread, and since these verbs have a H tone, Raising also applies giving a surface SH tone. (27e,f) provide examples of Raising as well. In addition, the derived SH spreads rightward since the final SL is singly-linked. We provide the examples in (28) to demonstrate that by placing an object after the verb in these tenses, the grammatical SL deletes as expected.

(28) Remote past, negative form

a. toyáá'- tál-à → toyáá'[tálá	we didn't count
b. toyáá'[tála maio	we didn't count bananas

Infinitive form

c. ko-tál-à → ko[tálá	to count
d. ko[tála maio	to count bananas

2.2.2 Tenses with a final H tone

Another tone that can be assigned to the final mora of the verb is a H tone. The negative future tense in (29) is assigned a final H.

(29) Future, negative: Base pattern and Final H tone

a. toíkaa[konaná	we will not hit each other
b. toíkaa[tálanelá	we will not count for each other

Other tenses which follow the same pattern are seen in (30).

(30) Immediate past, relative clause form

a. moond' óólâ twáa[koná	man we just hit
b. moond' óólâ twáa[tálá	man we just counted

Habitual, relative clause form

c. moond' óólâ to[kona.á	man who we always hit
d. moond' óólâ to[tála.á	man who we always count

In (31) we see other tenses which have the final H as well. Since these are assertive verbs, they also have a phrasal SL tone. The phrasal nature of the SL is confirmed by placing an object after the verb: as expected, the phrasal SL surfaces on the object, rather than surfacing as a SH tone on the verb (see 1.3.2).

(31) Tenses exhibiting the Base pattern, Final H tone, and Phrasal SL tone:
Immediate past, assertive form

a. nétwáa[konâ	we just hit
b. nétwáa[koná maiò	we just hit bananas
c. nétwáa[tálâ	we just counted
d. nétwáa[tálá maiò	we just counted bananas

Habitual, assertive form

e. nétó[kona.â	we always hit
f. nétó[kona.á maiò	we always hit bananas
g. nétó[tála.â	we always count
h. nétó[tála.á maiò	we always count bananas

2.3 Combinations of parameters

We now turn to melodies involving combinations of parameters. This section explains the tone patterns of the tenses which are characterized by some combination of V_2H tone, Final tone, and Penultimate L tone assignment, as well as a phrasal SL in the relevant clause types. We will see that the third principle, Penultimate L tone assignment, only occurs in conjunction with one of the other tone assignment principles.

2.3.1 Combinations with V_2H tone assignment and Final tone assignment

In (32), the negative habitual and negative subjunctive tenses are characterized by the addition of a V_2H and a final SL to the basic lexical contrast. V_2H then spreads right, and a SL is assigned to the final mora, where it surfaces as a Falling tone because of its combination with a final H.

(32) Tenses exhibiting Base pattern, V_2H tone, and Final SL tone:
Habitual, negative forms

a. toí[koná.â	we don't always hit
b. toí[tálá.â	we don't always count

Subjunctive, negative forms

c. toikaa[konánɛ̂	let's not hit each other
d. toikaa[tálánɛ̂	let's not count each other
e. toikaa[tálɛ̂	let's not count
f. toikaa[tálɛ̂ maio	let's not count bananas

This SL tone is not the phrasal SL, since this verb tense is nonassertive, a context not characterized by the phrasal SL. (32f) directly demonstrates that the final SL is grammatical, and not phrasal, since it does not surface on a following object. Instead, the Falling tone changes to a SH before a complement.

In (33), we see examples of the imperative and the affirmative relative clause form of the today past. These tenses are characterized by the addition of a V_2H and a final L. What should be noted about these forms is that the V_2H does not spread all the way to the final syllable. First, the V_2H is assigned to the second mora, and the L is assigned to the final mora. After these tones have been assigned, the V_2H spreads rightward; spreading stops at the penult, since the final mora already bears a L tone. Thus, grammatical final L behaves differently from grammatical final SL. When there is a grammatical SL, V_2H spreads to the final. After spreading, the SL tone is added, resulting in a Falling tone created by the H-SL combination, as seen in (32).

(33) Tenses exhibiting Base pattern, V_2H tone, and Final L tone:

Imperative, affirmative form

a. [konána	hit each other!
b. [tálána	count each other!

Today past, relative clause form

c. moond' óól' ɔ́ɔ[konéiɛ	man who hit for
d. moond' óól' ɔ́ɔ[táléilɛ	man who counted for

However, it should be noted that if the imperative verb stem is bimoraic, the addition of the final L occurs on the final mora, even though the final mora already bears a H tone. We therefore have a case of a Falling tone created from a H-L sequence: [konâ 'hit!' This fact demonstrates that the second half of a Falling tone is not always a SL tone, since in the imperative it is a regular L tone. Thus, we conclude that a Falling tone alone does not constitute evidence of the presence of a SL tone. Where possible, we must look to longer forms to determine if a tense is characterized by a L tone or a SL tone.

Moreover, H-tone bimoraic imperative forms pose another problem. The imperative form of 'count!' is [tálā. We might expect a Falling tone to surface on the second mora, resulting from V_2H assignment and final L assignment, as observed in the verb 'hit!' However, only a L surfaces on the second mora. A likely explanation for this fact has to do with the OCP, and will be addressed in the last section of the paper.

In (34), we see the 3rd singular, assertive form of the today past. This tense employs V_2H and a final L tone, and in addition has the phrasal SL tone. In (34a,b), the SL surfaces on the final mora of the object, confirming that this is a phrasal SL.

However, (34c,d) have a different surface tone pattern, with two final SH tones. As seen in (34e-k), this is simply the result of the general tone rules discussed earlier, which apply when a SL tone is present. After the assignment of lexical tone in (34e), H is assigned to the second stem mora in (34f), and a L is assigned to the final mora in (34g). Then in (34h), the V_2H spreads rightward until it reaches a mora already bearing a tone. Thus, H stops spreading at the penult. (34i) shows that the phrasal SL tone is assigned to the final mora, deleting the final L tone. This results in H and SL on adjacent moras, which is the relevant environment for rules creating and spreading SH. First, Raising occurs as in (34j). This triggers SH-Doubling in (34k), resulting in the surface form.

(34) Today past, 3rd singular, assertive form:
Base pattern, V_2H tone, Final L tone, and Phrasal SL tone

a. nóo[konéiɛ maiò	he hit for bananas
b. nóo[táléilɛ maiò	he counted for bananas
c. nóo[konéiɛ̋	he hit for
d. nóo[táléilɛ̋	he counted for

Derivation of (34c)

e. Lexical tone assignment	nóo[táleilɛ
f. V_2H tone assignment	nóo[táléilɛ
g. Final L tone assignment	nóo[táléilɛ̄
h. V_2H spread	nóo[táléilɛ̄
i. Phrasal SL assignment	nóo[táléilɛ̀
j. Raising	nóo[táléilɛ̀
k. SH-Doubling	nóo[táléilɛ̋

2.3.2 Combinations with Tone Assignment Principle 3:
Penultimate L tone assignment

The third parameter of tono-grammatical inflection is the addition of a penultimate L. This tone is always added in conjunction with either a V_2H or a Final tone. The penultimate L pattern is seen in (35) with the 3rd person, affirmative relative clause form of the present perfect continuous. This form has a V_2H and a penultimate L tone. The H is assigned to the second mora of the verb stem, and the L is assigned to the penultimate mora. The spreading of the V_2H stops with the antepenult, since the penultimate mora already bears a L tone.

(35) Present perfect continuous, 3rd singular, relative clause form:
Base pattern, V_2H tone, and Penultimate L tone

a. moond' óól' ɔ́ɔ[konááŋgéetɛ	man who has hit a little
b. moond' óól' ɔ́ɔ[tálááŋgéetɛ	man who has counted a little

Another pattern is seen in (36). These assertive forms are constructed by combining the basic lexical contrast with a V_2H, a penultimate L, and the phrasal SL tone of assertive verb forms. This phrasal SL is clearly seen in (36a,b), where it surfaces on the object.

(36) Present perfect continuous, 3rd singular, assertive form:
Base pattern, V_2H tone, Penultimate L tone, and Phrasal SL tone

a. nóo[konááŋgéetɛ maìò	he has hit bananas a little
b. nóo[tálááŋgéetɛ maìò	he has counted bananas a little
c. nóo[konááŋgéètɛ̀	he has hit a little
d. nóo[tálááŋgéètɛ̀	he has counted a little

In (36c,d), however, the phrase-final form of the verb has a different surface tone pattern. As seen in (37), this follows automatically from the rules that we have already posited.

(37) Derivation of (36c)

a. Lexical tone assignment	nóo[tálaaŋgeetɛ
b. V_2H tone assignment	nóo[táláaŋgeetɛ
c. Penultimate L tone assignment	nóo[táláaŋgeẽtɛ
d. V_2H spread	nóo[tálááŋgéẽtɛ
e. Phrasal SL assignment	nóo[tálááŋgéẽtɛ̀
f. SL-Spread	nóo[tálááŋgéẽtɛ̀
g. Raising	nóo[tálááŋgêẽtɛ̀

We begin with the lexical tone in (37a). In (37b,c), we assign the V_2H and the penult L. After these tones have been assigned, V_2H spreads rightward, as in (37d), until the L-tone penult, where it stops. In (37e) the phrasal SL links to the final mora. In (37f), the SL spreads left by SL-Spread. We now have a H tone adjacent to a SL tone, so Raising occurs, as seen in (37g).

In (38), we see another combination of parameters, as well as examples of a final Falling tone. The present perfect tense is characterized by a V_2H, a penultimate L, and a final Fall. All tones are assigned and then V_2H spreads up until it reaches a mora already bearing a tone, which in this case is the penult.

(38) Present perfect, negative form:
Base pattern, V_2H tone, Penultimate L tone, and Final Falling tone

a. toí[konááŋgéetê	we have not hit a little
b. toí[tálááŋgéetê	we have not counted a little

Another combination of parameters is found in (39). These tenses have a V_2H, a penult L, and a final H. As expected, the grammatical tones are assigned to the appropriate position and the V_2H spreads.

(39) Tenses exhibiting Base pattern, V_2H tone, Penultimate L tone, and Final H tone:
Today past, relative clause form

a. moond' óólá tó[konááŋgi.é	man who we hit a little
b. moond' óólá tó[tálááŋgilé	man who we counted a little

Present perfect continuous, relative clause form

c. moond' óólâ tó[konááŋgéeté	man who we hit a little
d. moond' óólâ tó[tálááŋgéeté	man who we counted a little

Present perfect continuous, negative relative clause form

e. moond' óólâ tótá[konéeté	man who we haven't hit yet
f. moond' óólâ tótá[táléeté	man who we haven't counted yet

We now turn to (40), where we find more examples of the today past, affirmative relative clause tense. The examples here are monosyllabic verb roots, in contrast to those given in (39a,b). These examples are interesting because the entire stem consists of only three moras: these verb stems are too short to accomodate all the grammatical tones. In such a case, we would expect there to be a strategy for determining which tones surface in the verb. As seen in (40), H-tone verbs and toneless verb verbs actually choose different strategies for determining the surface tone pattern.

(40) Trimoraic verb stems (from Monosyllabic verb roots)

Today past, relative clause form

toneless verbs → choose the V_2H tone

a. moond' óólâ tó[koníé	man who we hit
b. moond' óólâ tó[eβíé	man who we paid

H-tone verbs → choose the penultimate L tone

c. moond' óólâ tó[tálilé	man who we counted
d. moond' óólâ tó[tómi.é	man who we sent

(41) demonstrates the final combination of parameters. Like the examples in (39) and (40), these tenses select V_2H, a penult L, and a final H. In addition, they take a phrasal SL since they are assertive verbs.

(41) Today past, assertive form

a. nétó[konááŋgi.ê	we hit a little
b. nétó[tálááŋgilê	we counted a little

Present perfect continuous, assertive form

c. nétó[konááŋgéeté	we hit a little
d. nétó[tálááŋgéeté	we counted a little

We see that the same problem which we encountered in (40) arises in these forms as well. When we look at the trimoraic verb stems in (42), which arise with monosyllabic roots, we again find that there are not enough moras to accomodate all the tones that are assigned. As in the relative clause forms, the toneless verbs and H-tone verbs choose different strategies for determining which tones surface. The toneless verbs choose the V_2H tone, and the H-tone verbs choose the penultimate L.

(42) Trimoraic verb stems (from Monosyllabic verb roots)
Today past, assertive form
toneless verbs → choose the V_2H tone

a. nétó[koní.ɛ̂	we hit
b. nétó[ɛβíɛ̂	we paid

H-tone verbs → choose the penultimate L tone

c. nétó[tálilɛ̂	we counted
d. nétó[tómi.ɛ̂	we sent

One possible explanation for these different strategies has to do with avoiding an OCP violation: the initial and penultimate mora of the stem may not both bear a H tone if they are adjacent. This is demonstrated in (43a), with a derivation of (42a,c) in (43b).

(43) a. * H H
| |
[stem μ μ μ]

b. Derivation of (42a,c)

Lexical tone assignment	nétó[koni.ɛ	nétó[tálilɛ
V_2H tone assignment	nétó[koní.ɛ	N/A, OCP-violation
Penultimate L tone assignment	N/A, penultimate μ already bears a tone	nétó[tál ɪlɛ
Final H tone assignment	nétó[koní.ɛ̂	nétó[tál ɪlɛ́
V_2H Spread	N/A	N/A
Phrasal SL assignment	nétó[koní.ɛ̂	nétó[tálilɛ̂

Recall that there is one other case seen where the OCP appears to play a role. In the imperative of bimoraic verb stems, H-tone verbs and toneless verbs also behave differently. The forms are repeated in (44):

(44)	a. [konâ	hit!
	b. [tálā	count!

This tense is characterized by a V_2H and a final L tone. But in the H-tone verb /tál/, only the final L appears. Thus, placing a H tone on the final mora when it is adjacent to a H-tone stem-initial mora is also a violation of the OCP. We could modify our constraint against adjacent H tones as follows:

(45) * H H
| |
[stem μ μ (μ)]

Appealing to the OCP explains why H-tone and toneless bimoraic verbs behave differently in the imperative as well as in the today past tense. However, if the OCP is the explanation for H-tone and toneless monosyllabic verbs behaving differently in these two

tenses, it is interesting that it is only found in this specific context, whereas H tones are otherwise free to occur on adjacent moras. The revised constraint in (45) may also indicate that we need to appeal to foot structure or final extrametricality to explain the behavior of bimoraic and trimoraic verb stems in Kikamba. At any rate, this result indicates that further investigation is required to determine what role OCP-type phenomena play in Kikamba tonology.

3. Conclusion

In conclusion, we have demonstrated that the complex system of verb stem tone patterns in Kikamba can be accounted for by the interaction of a small set of general tone parameters. Lexically, the initial mora of the verb stem may be H or L. Assertive verbs are assigned a phrasal SL. This phrasal SL is affected by general tone rules in the language, resulting in a variety of surface tone patterns. And finally, we have shown that Kikamba employs three principles of grammatical tone assignment: V_2H tone assignment, Penultimate L tone assignment, and Final tone assignment. Together, these relatively few parameters can explain the wide variety of tonal patterns found in Kikamba verb stems.

Reference

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